

	Alpha 21264	AMD Athlon	Intel PIII	MIPS R12000
Clock rate	700MHz	1000 MHz	1000 MHz	300 MHz
Cache (I/D)	64K/64K	64K/64K	16/16/256	32K/32K
Issue rate	4 issue	3 x 86 instr	3 x 86 instr	4 issue
Pipe stages ‡	7/9 stages	9/11 stages	12/14	6 stages
Out of order	80 instr	72 ROPs	40 ROPs	48 instr
Rename regs	48/41	36/36	40 total	32/32
BHT entries	4K x 9-bit	4K x 2-bit	≥512	2K x 2-bit
TLB entries	128/128	280/288	32 1/64 D	64 unified
Memory B/W	2.66 GB/s	1.6 GB/s	1.06 GB/s	539 MB/s
Package	CPGA-588	CBGA-576	PGA-370	CPGA-527
IC process	0.25μ 6M	0.18μ 6M	0.18μ 6M	0.25μ 4M
Die size	205 mm ²	102 mm ²	106 mm ²	204 mm ²
Transistors	15.2 million	22 million	24 million	7.2 million
Est mfg cost*	\$160	\$70\$	\$40	\$140
Power (max)	75 W	60 W*	23 W*	20 W
SPEC95b†	35/55	42/30	47/32	18/30
Availability	3Q99	1Q00	1Q00	2Q99
1K list price	\$2,296\$\$	\$1299\$	\$990	Not public

†SPEC95 baseline (int/FP) ‡integer ALU/load §includes 512K L2 cache

CONVENTIONAL ART

Fig. 1

(A)

(B)

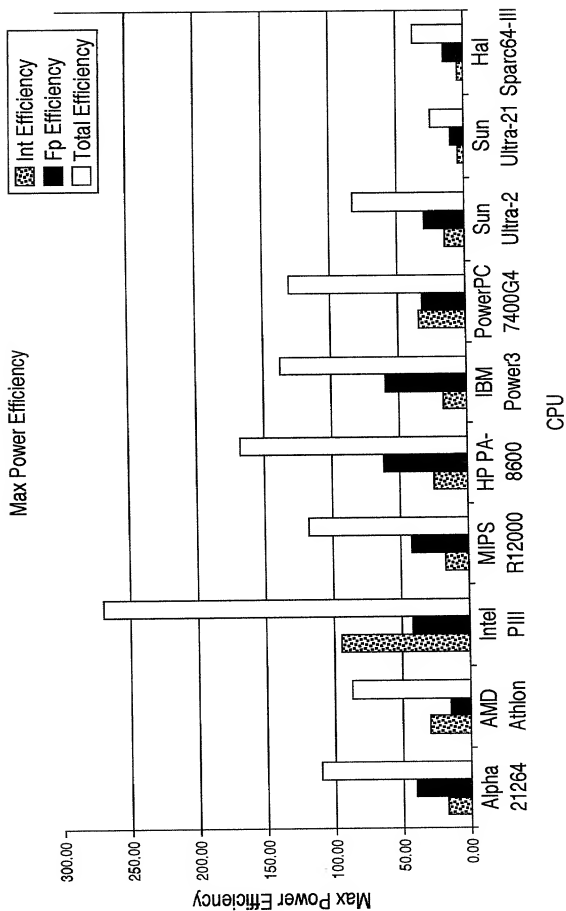
HP PA-8600	IBM Power3	PowerPC 7400 (G4)	Sun Ultra-2	Sun Ultra-21	Hal Sparc64-III
552 MHz	400 MHz	450 MHz	450 MHz	360 MHz	296 MHz
512K/1M	32K/64K	32K/32K	16K/16K	16K/16K	64K/64K
4 issue	4 issue	3 issue	4 issue	4 issue	4 issue
7/9 stages	7/8 stages	4/5 stages	6/9 stages	6/9 stages	8/10
56 instr	32 instr	5 instr	None	None	63 instr
56 total	16 int/24 fp	6 int/6 fp	None	None	34/32
2K x 2-bit	2K x 2-bit	512 x 2-bit	512 x 2-bit	512 x 2-bit	8K x 2-bit
120 unified	128/128	128/128	641/64D	641/64 D	32/32/256
1.54 GB/s	1.6 GB/s	1.6 GB/s	1.9 GB/s	600 MB/s	1.33 GB/s
LGA-544	SCC-1,088	CBGA-360	CLGA-787	PBGA-587	CLGA-957
0.25 μ 4M	0.22 μ 6M	0.22 μ 6M	0.29 μ 4M	0.29 μ 4M	0.25 μ 5M
477 mm ²	163 mm ²	83 mm ²	126 mm ²	150 mm ²	240 mm ²
130 million	23 million	10.5 million	3.8 million	4.1 million	17.6 million
\$330	\$110	\$45	\$70	\$85	\$250
60 W*	36 W	13 W	20 W	38 W	50 W
39/61	24/46	21/20	16/24	12/17	15/28
1Q00	1Q00	3Q99	4Q98	4Q98	4Q98
Not public	Not public	\$345	\$4,249\$\$	\$470	Not public

(C)

\$ includes 2M L2 cache (Source: vendors, except *MDR estimates)

CONVENTIONAL ART

Fig. 1 Continued



CONVENTIONAL ART

Fig. 2

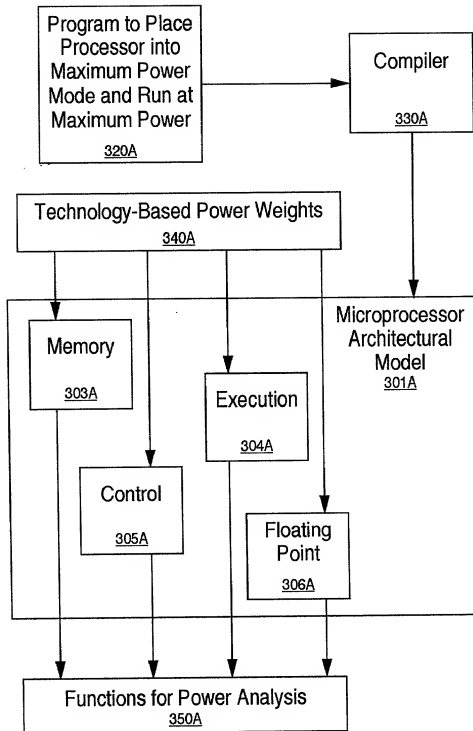
300A

Fig. 3A

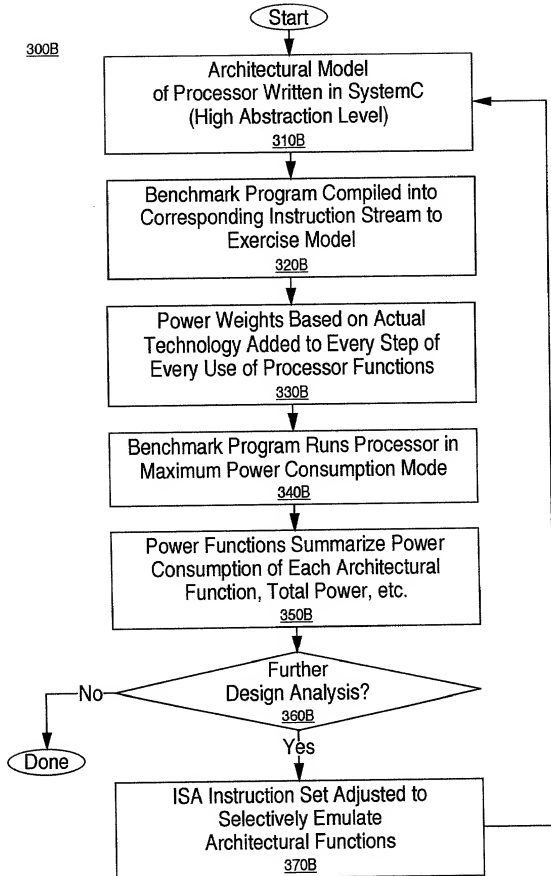


Fig. 3B

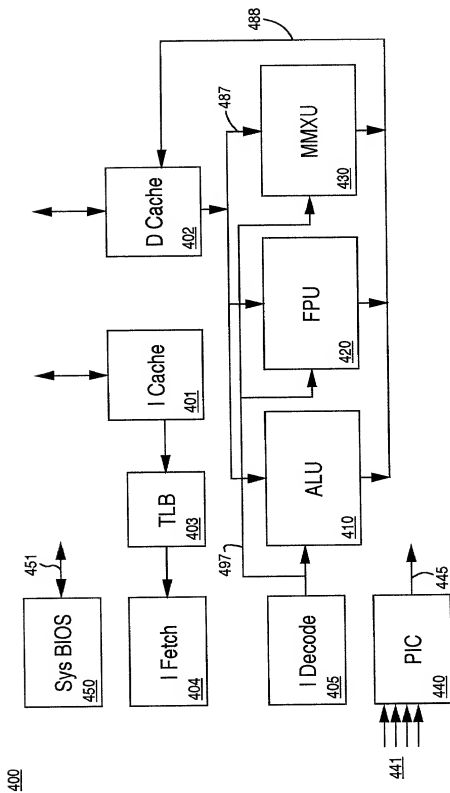


Fig. 4A

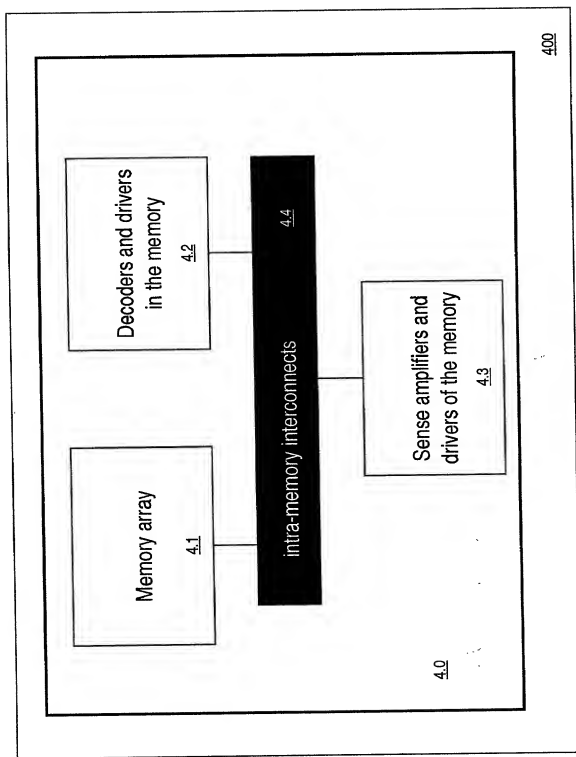


Fig. 4B

400B

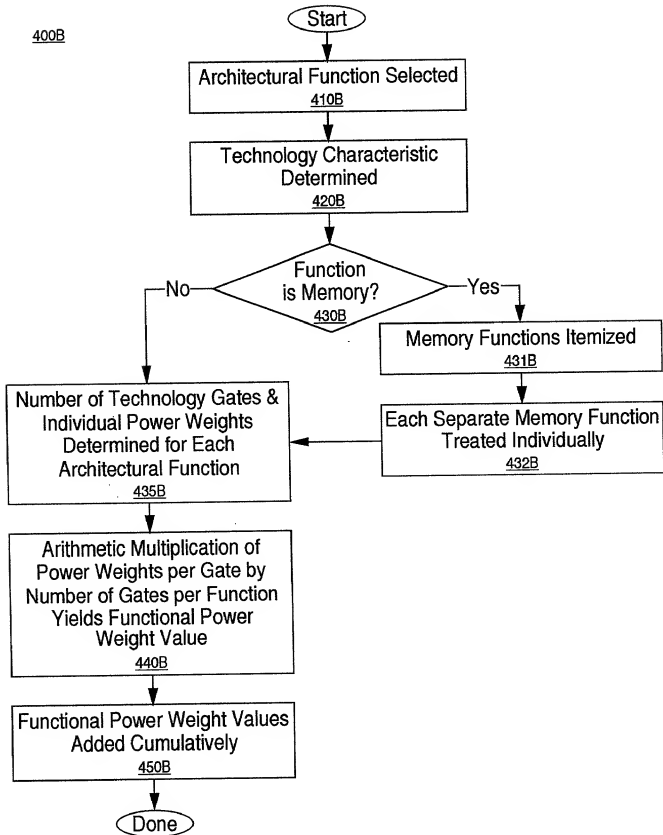


Fig. 4C

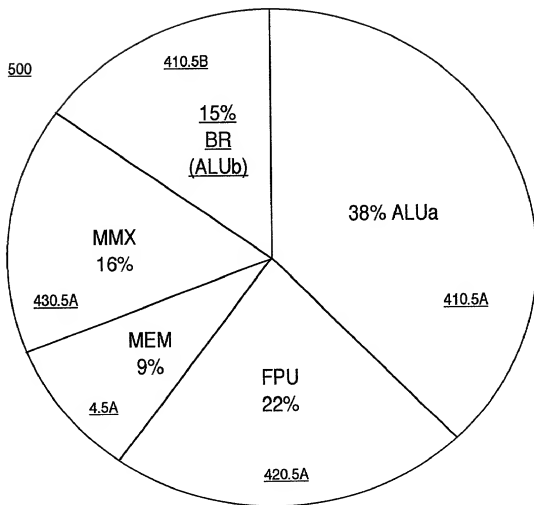


Fig. 5A

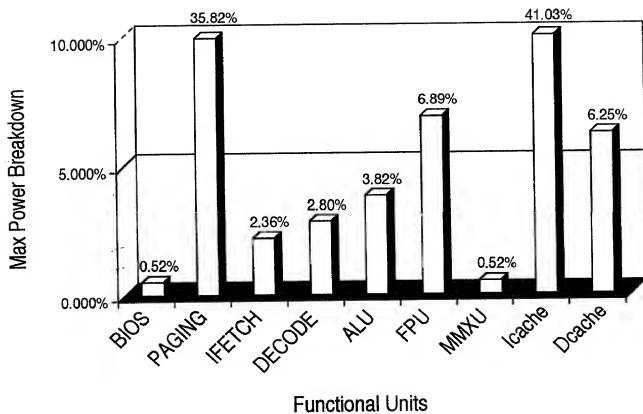


Fig. 5B

500C

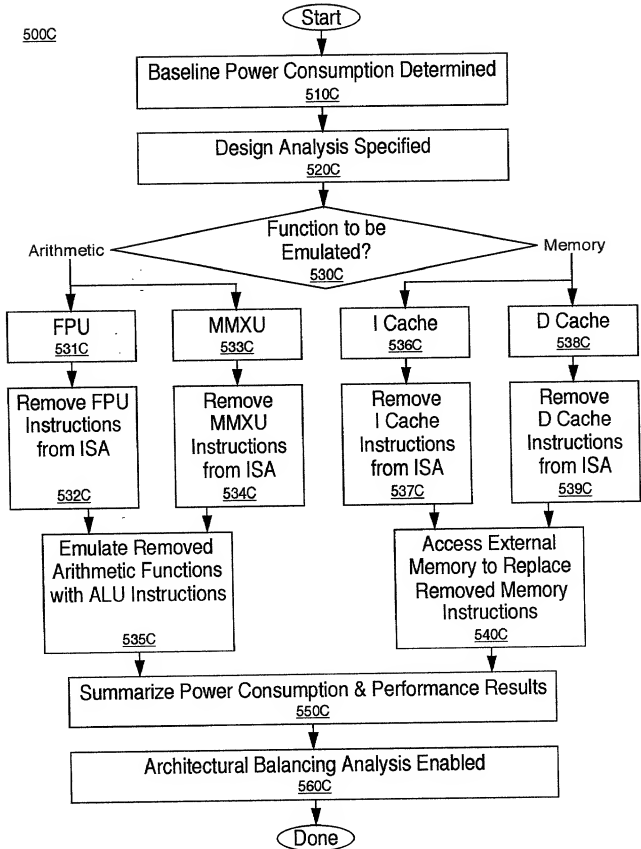


Fig. 5C